

Trout, Transit, and Town Centres: GIS and Web Applications for Integrating Fish into Complete Community Planning

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Abstract

In Georgia Basin and Puget Sound communities, land use planners and engineers are seeking ways to protect fish habitat while creating complete, sustainable, and livable communities. This paper reviews approaches used in the City of Burnaby, British Columbia to more closely understand fish habitat requirements, limiting factors to fish, and habitat enhancement opportunities. This limiting factor analysis has been conducted for specific streams throughout the municipality, and is linked to a Geographic Information System database. The database will also include information on water quality monitoring, pollution events, and fish releases. The City is working to make the mapping and data available to City staff, developers, and the general public through a web-based mapping application. The paper discusses how this layer of information can be used to inform local area plans, such as a transit-oriented town centre plan. The mapping allows planners, decision-makers, and the public to more clearly understand trade-offs and opportunities for habitat protection.

Introduction

In the Georgia Basin and Puget Sound, many communities are recognizing the importance of *complete community* or *smart growth* planning. These concepts seek to avoid urban sprawl, instead accommodating population growth within compact, walkable, livable communities, with homes close to work, transit, schools, and green space. If well designed, these land use patterns may have many environmental benefits including reduced car use, air pollution, and land used per person. This paper argues the importance of integrating other forms of environmental enhancements and protection within complete community planning and demonstrates a GIS and web-based tool for integrating fish protection and enhancement from the city of Burnaby. The project is being developed by the city in partnership with streamkeepers and provincial and federal agencies.

The City of Burnaby is a suburb directly east of Vancouver in the heart of the Greater Vancouver Regional District. Over the past 15 years, parts of Burnaby have changed dramatically, as the city has grown by 35% to its current population of 197,000. A small amount of population growth is being accommodated in green-field sites such as the UniverCity development on Burnaby Mountain. However, most population growth is being absorbed in existing suburban areas. As envisioned in the city's Official Community Plan (OCP), areas of low-density land use (e.g., industrial lands, car-oriented malls) are being transformed into compact, transit-focussed town centres.

Over the past century, salmon populations within Burnaby have sharply declined as the city has developed. This trend is consistent throughout urbanizing parts of the Georgia Basin and Puget Sound. By the 1970s, although more than 60 open watercourses remained in the city, there were no salmon runs in Burnaby's major creeks, such as Byrne, Brunette, Stoney, and Eagle Creek.

The past two decades have seen a remarkable turnaround. Thanks to the hard work of streamkeepers, landowners, academic institutions, and government, populations of resident trout have re-established in Burnaby streams, and small numbers of migratory salmon and trout have also begun to return.

The City of Burnaby has had strong environmental policies for many years. As the 1998 OCP notes: "*environmental stewardship should be viewed as a shared responsibility of senior and local governments, non-government organizations, the private sector and the general public. For its part, the City is committed to continue to show leadership in this area.*" Protecting watercourses has been a particular concern. In 1973, the city adopted an Open Watercourse policy to ensure that watercourses were not enclosed during development. Over the years, the city has added a Watercourse Bylaw (prohibiting deleterious substances from entering streams), sediment and erosion control requirements, riparian protection approaches, and integrated stormwater management plans.

The Strategic Overview of Fisheries Resources in Burnaby

While the city has undertaken numerous environmental initiatives including mapping and naming all watercourses, effective planning for fisheries, has been constrained by lack of comprehensive information on fisheries habitats. Many individuals are knowledgeable about Burnaby streams, including agency and city staff, stream stewards, consultants, and landowners, but no comprehensive collation of these data exists.

Planners are interested in understanding the nature of fisheries resources in order to meet regulatory requirements and provide development that results in *no net loss* or a *net gain*, in habitat. Without an understanding of the overall nature of fisheries resources for a creek, planning for individual site works or plan areas is difficult. For example, a development project may lead to an impact on fish habitat, and require remediation and compensation works. Knowledge of the stream system, including existing constraints to fish, is critical for selecting the most cost-effective and useful remediation plan.

Since 2001, the city has sought to fill this information gap by developing a *Strategic Overview of Fisheries Resources in Burnaby*. The document is designed to inform planning initiatives (integrated stormwater management plans, local area plans, park plans, transportation plans) as well as individual site works. The document should improve understanding of fisheries resources, help evaluate the fisheries implications of land use planning alternatives, help identify priority areas of fisheries concern, and assist in the selection of cost-effective habitat enhancement opportunities. Specific goals of the *Strategic Overview* are to:

- Collate and refine existing watercourse and storm drain mapping to document watershed drainage area, reach breaks and characteristics, fish-bearing status, and assessment of stream flow permanence.
- Evaluate existing and potential fisheries resources for streams within the city of Burnaby.
- Identify key limiting factors to fisheries resources.
- Identify priority actions for improving and protecting fish habitat.

The report was prepared in partnership with many individuals and groups. City staff were principal authors, with individual stream appraisals prepared in conjunction with consulting fisheries biologists and stream stewards. Staff from federal and provincial fisheries agencies, and a representative of stewardship groups provided technical review of Volume 1 of the report. Funding for consultants was provided by the provincial Urban Salmon Habitat Program.

Report Contents

The report is structured as four volumes, and is intended to be accessed interactively through the city's webpage and webmapper (located at <http://www.city.burnaby.bc.ca>). *Volume 1* is to be released in Spring 2003, with *Volumes 2-4* released publicly over the following year. Internal staff will also be able to access mapping through the city's Geographic Information System and intranet webmapper.

Volume 1 reviews the impacts of urbanization on Burnaby's fish habitat, outlining fish species historically and currently found in Burnaby streams. This *Volume* outlines the major limiting factors to fish in the city - fish barriers, streamside vegetation, instream habitat, and stormwater flows and quality. In describing each limiting factor, the report also outlines potential mitigation measures for addressing these factors and includes numerous examples and photographs from Burnaby streams.

Volumes 2 - 4 will be released over the next year and provide fisheries appraisals of individual watercourses within the city. The appraisals are grouped under three volumes for the three major watersheds in the city. The appraisals summarize fisheries values for each watercourse, describe past enhancement works, outline limiting factors to future fish habitat, and suggest priority fisheries enhancements.

Using the Report

Information from the overview is already being used extensively by city staff to inform planning initiatives such as local area plans, park plans, transportation plans, stormwater management plans, as well as individual site works. The City is working to make the mapping and data available to the public through a web-based mapping application. Public users are anticipated to be streamkeepers, consultants, agency staff, developers, and landowners. It will also be used as an educational and reference document for enquiries to the city about watercourses and fisheries requirements.

Integrating Fisheries Information into Complete Community Planning

An example of how planners can use the *Strategic Overview* was in development is the Holdom Area Plan. This Plan is intended to guide the transformation of a low-density industrial area into a transit-based town centre, with a high-street and mix of uses.

In developing the Holdom Area Plan, planning staff retrieved fisheries information from the Strategic Overview. The Overview showed that two watercourses ran through the area—Beecher Creek and Sunken Engine Creek. Beecher Creek had substantially higher fisheries values, with resident cut-throat trout and observations of coho salmon. However Beecher Creek is enclosed for a section within the plan area. Also the riparian vegetation was very narrow, with paved surfaces as close as a metre from top of creek bank. Sunken Engine Creek is entirely enclosed, except for the lowest creek reach (included in the plan area). The open Creek has almost no riparian vegetation and is bounded by a road and parking lot.

During plan development, the planning working group decided that fisheries enhancements should be focused on improving Beecher Creek. The Plan therefore includes direction to daylight the enclosed section, and add a 15m swath of riparian vegetation on either side of the creek. Sunken Engine Creek has less value, and while the Plan envisions retention of an open watercourse wherever possible, a 30m section would be enclosed as part of the high street development.

The plan was reviewed and supported by both senior government environmental agencies and stewardship groups, as providing a net gain to the environment. The Plan should also lead to a more dense, multi-use and transit-oriented community. The mapping from the Strategic Overview allowed planners and decision-makers to more clearly understand trade-offs and opportunities for habitat protection and enhancement during community planning processes.

Conclusions

Local governments are responsible for land use decisions on private land, but most community planners are not environmental specialists. If environmental information is to be reflected in land use decision-making, it is critical to provide environmental information in formats that are easy to understand. GIS and web-based tools offer opportunities for easy dissemination of information. The *Strategic Overview of Fisheries Resources* seeks to meet this need.